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Fc-receptor induced cell spreading during frustrated phagocytosis in J774A.1 macrophages[1] DANIEL KOVARI, JENNIFER CURTIS, WENBIN WEI, Georgia Institute of Technology — Phagocytosis is the process where by cells engulf foreign particles. It is the primary mechanism through which macrophages and neutrophils (white blood cells) eliminate pathogens and debris from the body. The behavior is the result of a cascade of chemical and mechanical cues, which result in the actin-driven expansion of the cell's membrane around its target. For macrophages undergoing Fc-mediated phagocytosis, we show that above a minimum threshold the spreading rate and maximum cell-target contact area are independent of the target's opsonin density. Qualitatively, macrophage phagocytic spreading is similar to the spreading of other cell types (e.g. fibroblasts, lymphocytes, and Dict.d.). Early spreading is most likely the result of "passive" alignment of the cell to the target surface. This is followed by an active expansion period driven by actin. Finally upon reaching a maximum contact area, typically 2-3 times the size of "non-activated" cells, macrophages often undergo a period of rapid contraction not reported in other cell types. We hypothesize that this, as yet unexplained, transition may be specific to the chemical and mechanical machinery associated with phagocytosis.

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